

4,5,14,15,24 and 25 are cancelled and the informalities noted by the Examiner have been corrected appropriately as suggested. Claims 1, 8, 11,18, 20, 21 and 28 have been amended and all claims are now believed to be in allowable condition.

- 5 Reconsideration of the objection to Claims 4, 5, 11-31 due to the informalities noted by the Examiner is requested based on the following argument.

 Claims 4,5,14,15,24 and 25 are cancelled so that the informality occurring in these claims is inconsequential. In Claims 8,18 and 28 "AL" has
10 been changed to "Al" as suggested by the Examiner. In Claims 11 and 21 "the" has been changed to "a" where the Examiner has indicated this change to be appropriate, and in the two instances in Claim 20, pointed out by the examiner, where "then" is used instead of "than" the change to "than" has been made.

- Reconsideration of the rejection of Claims 4,5,14,15,24 and 25 under 35
15 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention is requested based on the following reason.

 Claims 4,5,14,15, 24 and 25 are cancelled.

- 20 Reconsideration of the rejection of Claims 1,2,6-11,12 and 16-19 under 35 U.S.C.103 (a), as being unpatentable over Kida, U.S. Patent 6,313,540, is requested, based on the following argument.

Applicant's patent is based on the requirement for trenches to be in a mesh pattern so that not only is cracking of the IMD far less likely to occur but even if a crack is initiated it is confined to a single cell. This provides for a significant reliability improvement. However, as described in the

5 specifications, it was found by Applicants that void formation occurs to an intolerable degree for completely crossing trenches. The limitation of the invention to prevent void formation was not specified in Claim 1, which is now amended to include this limitation. This limitation was already included in independent Claims 11 and 21.

10 Kida uses large area via holes to restrict insulator layer cracking, requiring that at least one via hole per pad have an area that is at least 3% of the pad area. No other requirements are specified concerning restriction of insulator cracking. Neither the shape of the via holes, or the shape of the via hole openings, which are the shapes given in Kida's Fig. 7, are assigned any
15 relevance by Kida to restriction of insulator layer cracking. Kida does not address the problem of void formation.

Reconsideration of the rejection of Claims 3-5 and 13-15 under 35 U.S.C.103 (a), as being unpatentable over Kida, as applied to Claims 1,2,6-11,12 and 16-19, in view of Saran, U.S. Patent 6,232,662 is requested, based
20 on the following argument.

Applicant's patent is based on the requirement for trenches to be in a mesh pattern so that not only is cracking of the IMD far less likely to occur but even if a crack is initiated it is confined to a single cell. This provides for a

significant reliability improvement. However, as described in the specifications, it was found by Applicants that void formation occurs to an intolerable degree for completely crossing trenches. The limitation of the invention to prevent void formation was not specified in Claim 1, which is now
5 amended to include this limitation. This limitation was already included in independent Claims 11 and 21.

Kida uses large area via holes to restrict insulator layer cracking, requiring that at least one via hole per pad have an area that is at least 3% of the pad area. No other requirements are specified concerning restriction of
10 insulator cracking. Neither the shape of the via holes, or the shape of the via hole openings, which are the shapes given in Kida's Fig. 7, are assigned any relevance by Kida to restriction of insulator layer cracking. Kida does not address the problem of void formation.

None of the applied or known references address the invention as shown
15 in the amended claims in which a bonding pad is formed that is highly resistant to the formation of IMD cracks and in which the length of cracks that do form are limited by the cell size of a trench mesh pattern and where the trenches of the mesh pattern do not completely intersect. The invention is believed to be patentable over the prior art cited, as it is respectfully suggested that the
20 combination of these various references cannot be made without reference to Applicant's own invention. None of the applied references address the problem of providing a bonding pad that is resistant to IMD crack formation and where the length of cracks that do form can be limited so as to pose no reliability

problem. Furthermore, by limiting the invention so that trenches do not completely intersect problems related to void formation are avoided.

Applicant has claimed his process in detail. The processes of claims 1- 10 and 11-20 are believed to be novel and patentable over these various references, 5 because there is not sufficient basis for concluding that the combination of claimed elements would have been obvious to one skilled in the art. That is to say, there must be something in the prior art or line of reasoning to suggest that the combination of these various references is desirable. We believe that there is no such basis for the combination.

10 Reconsideration of the rejection of Claims 11, 12, 16-19, 20-22 and 26-31 under 35 U.S.C.103 (a), as being unpatentable over Kida, as applied to Claims 1,2,6-11,12 and 16-19, in view of Huang et al., U.S. Patent 6,236,114 is requested, based on the following argument.

Applicant's patent is based on the requirement for trenches to be in a 15 mesh pattern so that not only is cracking of the IMD far less likely to occur but even if a crack is initiated it is confined to a single cell. This provides for a significant reliability improvement. However, as described in the specifications, it was found by Applicants that void formation occurs to an intolerable degree for completely crocking trenches. The limitation of the 20 invention to prevent void formation was not specified in Claim 1, which is now amended to include this limitation. Independent this limitation was already included in independent Claims 11 and 21.

Kida uses large area via holes to restrict insulator layer cracking, requiring that at least one via hole per pad have an area that is at least 3% of the pad area. No other requirements are specified concerning restriction of insulator cracking. Neither the shape of the via holes, or the shape of the via
5 hole openings, which are the shapes given in Kida's Fig. 7, are assigned any relevance by Kida to restriction of insulator layer cracking. Kida does not address the problem of void formation.

None of the applied or known references address the invention as shown in the amended claims in which a bonding pad is formed that is highly resistant
10 to the formation of IMD cracks and in which the length of cracks that do form are limited by the cell size of a trench mesh pattern and where the trenches of the mesh pattern do not completely intersect. The invention is believed to be patentable over the prior art cited, as it is respectfully suggested that the combination of these various references cannot be made without reference to
15 Applicant's own invention. None of the applied references address the problem of providing a bonding pad that is resistant to IMD crack formation and where the length of cracks that do form can be limited so as to pose no reliability problem. Furthermore, by limiting the invention so that trenches do not completely intersect problems related to void formation are avoided.
20 Applicant has claimed his process in detail. The processes of claims 11- 20 and 21-31 are believed to be novel and patentable over these various references, because there is not sufficient basis for concluding that the combination of claimed elements would have been obvious to one skilled in the art. That is to

say, there must be something in the prior art or line of reasoning to suggest that the combination of these various references is desirable. We believe that there is no such basis for the combination.

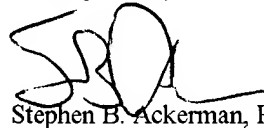
In summary, all claims are now believed to be in allowable condition and
5 reconsideration of the objections and allowance is therefor respectfully requested.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned

"VERSION WITH MARKINGS TO SHOW CHANGES MADE"

10 It is requested that should there be any problems with this Amendment, please call the undersigned attorney at (845) 452-5863.

Respectfully submitted,



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**“VERSION WITH MARKINGS TO SHOW CHANGES
MADE”**

In the claims:

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1. A method of forming a bonding pad that is immune to
IMD

cracking, comprising:

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providing a partially processed semiconductor wafer having all metal
levels completed;

forming a blanket dielectric layer over the uppermost metal level;

patterning and etching said dielectric layer to form horizontal and
vertical arrays of trenches passing through said dielectric layer, such
that none of said horizontal trenches completely intersects any of

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said vertical trenches, and separating said dielectric layer into cells;

filling said trenches with a conducting material;

performing CMP;

depositing bonding metal patterns;

bonding wires onto said bonding metal patterns;

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forming a passivation layer.

Claim 4 is cancelled.

Claim 5 is cancelled.

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8. The method of Claim 1 wherein the filling of said trenches with a
conducting material is accomplished using a plug process from the
set: [AL] Al plug, Cu plug, silicide plug.

11. A method of forming a bonding pad that is immune to IMD cracking,
comprising:
providing a partially processed semiconductor wafer having all metal
levels completed;
5 forming a blanket dielectric layer over the uppermost metal level;
patterning and etching said dielectric layer to form horizontal and
vertical arrays of trenches passing through said dielectric layer
according to [the] a nonintersecting layout;
filling said trenches with a conducting material;
10 performing CMP;
depositing bonding metal patterns;
bonding wires onto said bonding metal patterns;
forming a passivation layer.

Claim 14 is cancelled.

- 15 Claim 15 is cancelled.

18. The method of Claim 11 wherein the filling of said trenches with a
conducting material is accomplished using a plug process from the
set: [AL] Al plug, Cu plug, silicide plug.
20. The method of claim 11 wherein the separation between neighboring
20 horizontal trenches and neighboring vertical trenches is between about
0.1 and 10 micrometers, and the ratio between the spacing of
perpendicular trenches to the spacing of parallel trenches is less than

[then] about 1/5, and the spacing of perpendicular trenches is greater
than [then] about 0.1 micrometers

22. A method of forming a bonding pad that is immune to IMD cracking,
comprising:

- 5 providing a partially processed semiconductor wafer having all metal
levels completed;
forming a blanket dielectric layer over the uppermost metal level;
patterning and etching said dielectric layer to form horizontal and
vertical arrays of trenches passing through said dielectric layer
10 according to [the] a brick laying layout or [the] a modified brick
laying layout;
filling said trenches with a conducting material;
performing CMP;
depositing bonding metal patterns;
15 bonding wires onto said bonding metal patterns;
forming a passivation layer.

Claim 24 is cancelled.

Claim 25 is cancelled.

28. The method of Claim 21 wherein the filling of said trenches with a
20 conducting material is accomplished using a plug process from the
set: [AL] Al plug, Cu plug, silicide plug.